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Frequently Asked Questions about Perchlorate Issues

What is perchlorate?

Perchlorate (ClO_4^-) originates as a contaminant in the environment from the solid salts of ammonium, potassium, or sodium perchlorate. The perchlorate part of the salts are quite soluble in water. The resultant anion (ClO_4^-) is very mobile in aqueous systems. It can persist for many decades under typical groundwater and surface water conditions, because of its resistance to react with other available constituents.

Subsequent to the development of a new chemical analytic detection methodology in April 1997, which can detect perchlorate at levels of four parts per billion (ppb) and above, perchlorate has been measured at various manufacturing sites and in well water and drinking water supplies in California, Nevada, and Utah. The majority of locations where perchlorate has been detected in the groundwater are in California, associated with 12 facilities which have manufactured or tested solid rocket fuels for the Department of Defense (DoD) or the National Aeronautics and Space Administration (NASA). Two facilities which manufactured ammonium perchlorate in Nevada were found to have released perchlorate to groundwater which is the source for low levels (4 to 16 ppb) in Lake Mead and the Colorado River. This water is used for drinking water supply, irrigation and recreation for millions of people in Nevada, California, and Arizona. Other releases to surface water or groundwater have been detected in Arkansas, Indiana, Iowa, Maryland, New Mexico, New York, Pennsylvania, Texas, Utah, and West Virginia.

Information on other potential sites across the country is being gathered from DoD and NASA searches and from EPA information requests made to perchlorate manufacturers. There are 44 states with confirmed perchlorate manufacturers or users based on EPA information requests. EPA has notified State, Tribal, and local governments when it has evidence of perchlorate manufacture and use in their jurisdictions. At this time there has not been a systematic national survey of perchlorate occurrence. The American Water Works Association Research Foundation (AWWARF) is coordinating a survey to characterize possible perchlorate contamination of drinking water sources in areas of high risk. EPA will build upon these survey data and other information in order to discover potential sources and evaluate threats to water resources.

What are possible sources of contamination?

Ammonium perchlorate is manufactured for use as the oxidizer component and primary ingredient in solid propellant for rockets, missiles, and fireworks. Large-scale production began in the United States in the mid-1940s. Because of its shelf life, it must be periodically washed out of the country's missile and rocket inventory and replaced with a fresh supply. Thus, large volumes of the compound have been disposed of since the 1950s in Nevada, California, Utah, and likely other states. Perchlorate salts are also used on a large scale as a component of air bag inflators. Ammonium perchlorate is also used in the manufacture of matches and in analytical chemistry.

Other uses of perchlorate salts include their use in nuclear reactors and electronic tubes, as additives in lubricating oils, in tanning and finishing leather, as a fixer for fabrics and dyes, in electroplating, in aluminum refining, in rubber manufacture, and in the production of paints and enamels. Chemical fertilizer also has been reported to be a potential source of perchlorate contamination.

What are concerns regarding exposure to perchlorate?

Potassium perchlorate was used previously in the United States to treat hyperthyroidism (excessive functional activity of the thyroid gland) resulting from an autoimmune condition known as Graves' disease. Potassium perchlorate is still used diagnostically to test thyroid hormone levels in some clinical settings. The basis for the effect on thyroid hormone function is the competitive inhibition of iodide anion uptake by the thyroid which results in reduced thyroid hormone production. Thyroid hormone deficiencies can affect normal metabolism, growth and development. Disruption of the thyroid hormone homeostasis (stable equilibrium) can also result in the formation of thyroid tumors, particularly in rodents.

Perchlorate is of concern because of: 1) existing uncertainties in the toxicological database to adequately address the potential for perchlorate to produce human health/ecotoxicological effects at low levels in drinking water; 2) uncertainties regarding the extent of the occurrence of perchlorate in ground and surface waters; 3) the efficacy of different treatment technologies for various water uses; and 4) the extent and nature of ecological impact or transport and transformation phenomena in various environmental media.

What new information has the EPA released about potential risks to human and ecological health due to perchlorate?

The external review draft (ERD) of the document entitled *Perchlorate Environmental Contamination: Toxicological Review and Risk Characterization* was completed December 31, 1998. The document, developed by the U.S. Environmental Protection Agency's (EPA) National Center for Environmental Assessment (NCEA), Office of Research and Development (ORD), was reviewed by ten independent scientists on February 10 and 11, 1999 in San Bernardino,

California. A Federal Register Notice announcing the external peer review meeting and the availability of the draft document was published on January 14, 1999 (64 FR 2492). The development of the draft is part of a wider interagency effort to address environmental contamination issues related to perchlorate. The purpose of this document is to provide scientific support and rationale for hazard identification and dose-response assessments based on the emerging data for both human health and ecological effects caused by exposure to perchlorate. It is not intended to be a comprehensive study on the chemical or toxicological nature of perchlorate.

How do you get a copy of the ERD?

The draft document can be downloaded from the NCEA website at *http://www.epa.gov/ncea/perch.htm*. Copies of the document are also available at all EPA Regional Office Superfund Records Centers. Copies of the documents as well as all supporting information, will be available for review at the following locations: EPA Regional Office Superfund Records Centers in Dallas, TX (Region 6), Denver, CO (Region 8) and San Francisco, CA (Region 9); EPA Headquarters Information Resources Center, Washington, DC; NCEA Offices in Cincinnati, OH and Research Triangle Park, NC; California Department of Health Services; California Environmental Protection Agency's Office of Environmental Health Hazard Assessment; and the Operation Toxicology Branch at Wright-Patterson Air Force Base, Dayton, OH.

Are there federal regulations about perchlorate?

The Safe Drinking Water Act (SDWA), enacted by Congress in 1974 and amended in 1986 and 1996, provides the basis for safeguarding public drinking water systems from contaminants that pose a threat to public health. The purpose of SDWA is to protect public health by ensuring that public drinking water systems provide tap water that is safe for drinking and bathing. Within EPA, the Office of Ground Water and Drinking Water (OGWDW) develops National Primary Drinking Water Regulations (NPDWR) to control the levels contaminants that may occur in public drinking water systems. There is currently no National Primary Drinking Water Regulation (NPDWR) for perchlorate.

The 1996 amendments to the SDWA require EPA to publish a list of contaminants that are not currently subject to a NPDWR and are known or anticipated to occur in public water systems. This list, known as the Contaminant Candidate List (CCL), will be the source of priority contaminants for research, guidance development, and selection of contaminants for making regulatory determinations and/or monitoring by the States. The CCL consists of 50 chemical and 10 microbiological contaminants and is divided into two categories: (1) contaminants for which sufficient information exists to begin to make regulatory determinations by 2001, and (2) contaminants for which additional research and occurrence information is necessary before regulatory determinations can be made. Perchlorate is identified as a contaminant needing

additional research in the areas of health effects, treatment technologies, analytical methods, and more complete occurrence data. Perchlorate was placed on the Office of Water's Contaminant Candidate List in March 1998, and noted that it requires additional research and information before regulatory determinations can be made again in 2003.

Are there state regulations about perchlorate?

In 1997, California established an action level of 18 parts per billion (ppb) for perchlorate in public water supplies. Perchlorate concentrations lower than 18 ppb are not considered to pose a health concern for the public, including children and pregnant women. The California Department of Health Services (CA DHS) advises water utilities to remove drinking water supplies from service if they exceed the 18 ppb action level. If the contaminated source is not removed from service due to system demands and if drinking water that is provided by the utility exceeds the action level, CA DHS will advise the utility to arrange for public notification to its customers. On August 1, 1997, CA DHS informed drinking water utilities of its intention to develop a regulation to require monitoring for perchlorate as an unregulated chemical. Legislative action to establish a state drinking water standard for perchlorate was passed in 1998 (CA Senate Bill 1033) but was vetoed by the governor due to uncertainties in the schedule for completion of toxicological studies.

In August, 1997, the Nevada Division of Environmental Protection determined that the health-based action level of 18 ppb, as established in California, would be the recommended action level for cleanup pending a more current risk assessment.

No other state is known to have adopted action levels for perchlorate primarily since levels greater than 18 ppb have not been found in water supplies in other states.

What is the Interagency Perchlorate Steering Committee (IPSC)?

The Interagency Perchlorate Steering Committee (IPSC) was formed in January 1998 and is now a partnership of representatives from 18 different government agencies. Its purpose is to ensure an integrated approach to addressing perchlorate issues and to inform and involve stakeholders about developments in the technical and regulatory arenas. Four EPA representatives serve on the Executive Committee of the IPSC and EPA representatives serve on all of the subcommittees of the IPSC (health effects/toxicity, ecological impacts/transport and transformation, treatment technology, analytical, communications and outreach, and external peer review).
It should be noted that the assessment effort for perchlorate was accomplished in an extraordinarily expedited time frame through the partnership of the IPSC membership.

As of August 1998, the following agencies are members of the IPSC: U.S. Environmental Protection Agency, Department of Defense, Agency for Toxic Substances and Disease Registry, National Institute for Environmental Health Sciences, National Aeronautics & Space

Administration, Bureau of Indian Affairs, Arizona Department of Environmental Quality, Arizona Department of Health Services, California Department of Health Services, Nevada Division of Environmental Protection, Texas Natural Resource Conservation Commission, Utah Department of Environmental Quality, Utah Department of Health Laboratories, Cocopah Tribe, Colorado River Indian Tribes, Fort Mojave Tribe, Chemehuevi Tribe, Quechan Tribe.

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U.S. Environmental Protection Agency World Wide Web Sites

EPA Perchlorate Web site:	http://www.epa.gov/ogwdw/ccl/perchlor/perchlo.html
EPA (NCEA) ERD Web site:	http://www.epa.gov/ncea/perch.htm